

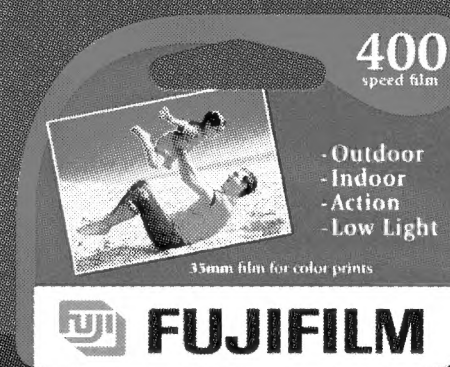
MAY/JUNE 2005

Zoogoer

VOLUME 34, NUMBER 3



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Among the best recognized, but rarest animals in the world, giant pandas have come to symbolize endangered species and international conservation efforts. In an effort to help protect the giant pandas and secure their future, Fujifilm is proud to be the lead corporate sponsor of the Zoo's giant panda program.

Fujifilm's support helped the National Zoo bring giant pandas Mei Xiang and Tian Tian to Washington, and is assisting the Zoo's experts to develop the scientific knowledge they need to ensure the survival of pandas in the wild. Fujifilm also supports comprehensive conservation education programs designed to help children and adults learn more about giant pandas and the conservation of all wildlife and their habitats.

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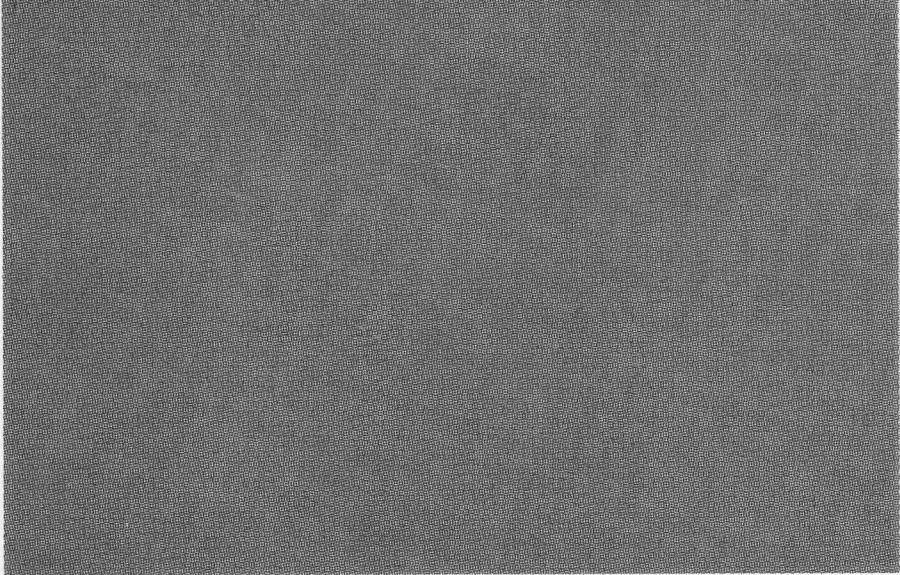


Smithsonian
National Zoological Park

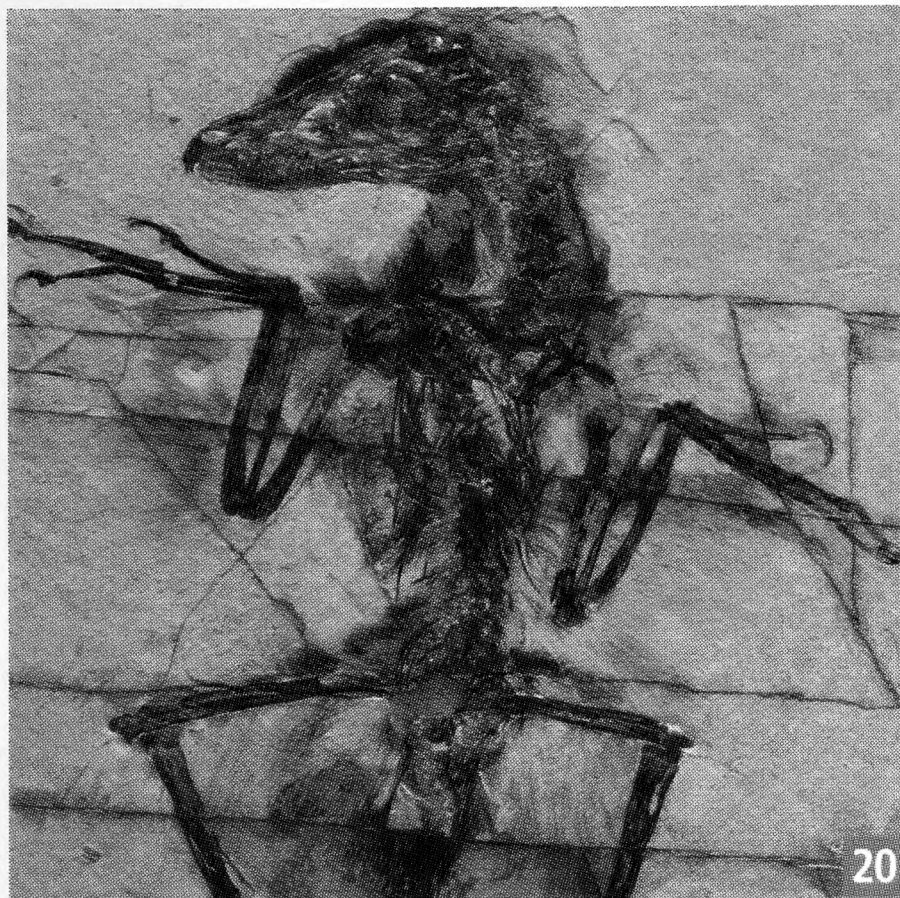


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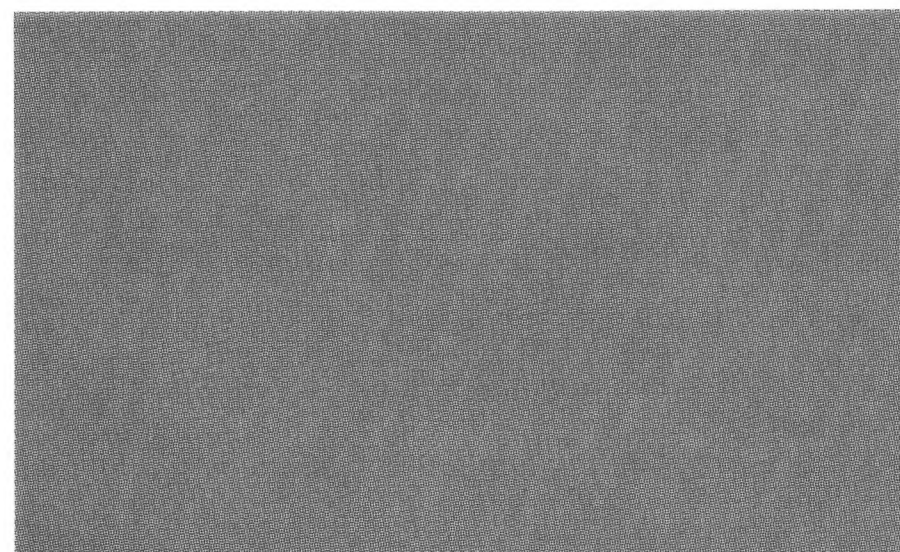
Bruce Beehler



Mick Ellison



Jessie Cohen/NZP



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BY SHANNON LYONS

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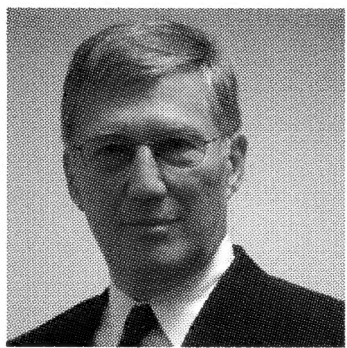
Are great expectations ahead for giant pandas Mei Xiang and Tian Tian? 🐾 Prairie dogs and a black-footed ferret share new digs at the Small Mammal House. 🐾 Celebrate spring at the National Zoo's upcoming events.

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FONZForum

National ZooFari: It's a Wing Ding!

With this letter, I introduce myself to you as the new Executive Director of Friends of the National Zoo.* I have served as the Deputy Executive Director of FONZ for more than 15 years and am thrilled to take on the challenges of leading our organization. Faced with completing a comprehensive facilities revitalization program in a time of shrinking federal appropriations, the National Zoo needs FONZ's support more than ever before. I am committed to finding the ways and means necessary to provide this support to your Zoo—the nation's Zoo—and our important conservation mission. And I am relying on all of you, the members of FONZ, to join me in this effort to contribute to our success.

There are many ways that FONZ members can get involved, and coming right up is one of the easiest and best: National ZooFari 2005 on May 19. This renowned gala fundraiser features gourmet food from more than 100 of Washington's best restaurants and most distinguished chefs, fine wines from more than 20 world-class wineries, musical entertainment, a silent auction, and a fabulous evening with friends at the Zoo—and all proceeds go to support the Zoo. Generous contributions—of food, wine, goods and services, and money—from individuals, the local community, and companies across the country keep our costs low and our income high. Last year, for instance, National ZooFari netted more than \$350,000 for Zoo programs. Over the years, ZooFari has raised millions of dollars for a variety of Zoo initiatives, from new and improved exhibits to conservation programs dedicated to the survival of giant pandas, Komodo dragons, tigers, and other endangered animals.

ZooFari 2005's theme is "Wing Ding—A Celebration of Birds at the National Zoo." Wing Ding highlights the Zoo's marvelous collection of native and exotic birds, from majestic bald eagles and flashy flamingos to the Guam rails and Micronesian kingfishers that National Zoo scientists have helped save from extinction. This issue of *ZooGoer* offers a series of short essays on just a few of the bird species found at the Zoo, to whet your appetite for visiting the Bird House, Amazonia, and other havens for avian fauna here.

ZooFari also highlights the work of National Zoo scientists to study and protect birds and their habitats around the globe, and previews plans for two new exhibits: one on migratory birds that will be sited in the former wetlands areas outside the Bird House, and another on mangrove forest habitats that provide homes for birds and many other species. Finally, it coincides with the launch of a major new program called the Smithsonian Ornithology Initiative, which Interim National Zoo Director David Evans describes in "For the Birds" on the facing page. The National Zoo, with its roster of eminent ornithologists, is a leader in this effort to advance the study of birds. You can help support all of these efforts by coming to Wing Ding! Find out more about this great party for a great cause and order your tickets today at www.fonz.org/zoofari.htm.

Please also remember to return the ZooFari Sweepstakes entry you received in your mailbox recently for a chance to win hundreds of exciting prizes ranging from behind-the-scenes tours of the Zoo to an extravagant Caribbean holiday at the spectacular private paradise of the Peter Island Resort in the British Virgin Islands.

I am looking forward to seeing you at ZooFari, and at the Zoo throughout the year. And please, feel free to email me at jschroeder@fonz.org with your ideas about how we can better serve you, our members, and our visitors, our animals, and the National Zoo. Thank you for your support.

Sincerely,

James M. Schroeder
Executive Director

* Tom LaRock resigned as Executive Director effective March 27, 2005. FONZ is grateful for his service and wishes him well.



is a nonprofit organization dedicated to supporting the conservation, education, and research efforts of the Smithsonian's National Zoo. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital. Friends of the National Zoo is dedicated to supporting the National Zoo in a joint mission to study, celebrate, and protect the diversity of animals and their habitats.

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Smithsonian National Zoological Park is located at 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537. Weather permitting, the Zoo is open every day except December 25. Hours: From April 3 to October 31, grounds are open from 6 a.m. to 8 p.m.; buildings, 10 a.m. to 6 p.m. From November 1 to April 2, grounds are open from 6 a.m. to 6 p.m.; buildings, 10 a.m. to 4:30 p.m.

Membership in FONZ offers many benefits: programs, publications, discounts on shopping and events, free parking, and invitations to special programs and activities to make zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537, call 202.633.3034, or go to www.fonz.org.

Membership categories and annual tax-deductible dues are:

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Contributing	\$75
Sustaining	\$150
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Cover photo: A double-wattled cassowary (*Casuarus casuarus bicarunculatus*) at the National Zoo's Bird House. Photo by Jessie Cohen/NZP.

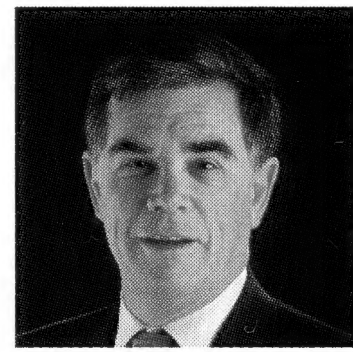


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The Smithsonian's National Zoo is accredited by the American Zoo and Aquarium Association.

Letter from David L. Evans



For the Birds

Serving as Interim Director of the National Zoo is a wonderful experience. I am thoroughly enjoying working directly with Zoo and FONZ staff and learning first-hand about both the challenges and the delights of managing a collection of living animals. All by itself, the chance to watch the playful antics of our growing cheetah cubs nearly every day has eased the burden of doing two jobs at once. That I can look out the window of my Zoo office and see wild birds, from downy woodpeckers to red-tailed hawks, adds to the pleasure of being here.

In my dual role as Zoo Director and Under Secretary for Science, I also appreciate having the opportunity in these letters to share with FONZ members more about science throughout the Smithsonian and how science at the Zoo fits into this bigger picture. Last month, I introduced the Smithsonian's strategic plan for science. This month, I'd like to describe an exciting new program called the Smithsonian Ornithology Initiative.

Ornithology—the study of birds—is one of the historic passions of Smithsonian scientists, and research on birds and their conservation continues to be one of the Institution's great strengths. As a testimony to this, three Smithsonian Secretaries—Spencer Baird, Alexander Wetmore, and S. Dillon Ripley—conducted seminal ornithological investigations.

You are most likely familiar with the Zoo's Migratory Bird Center (MBC). Every year, billions (really) of birds fly between temperate breeding and tropical wintering ranges, a grand phenomenon that is unceasingly fascinating for humans. To put that in perspective, imagine yourself running or swimming 8,000 miles without stopping. And make the trip in eight or ten days! Led by ornithologist Russell Greenberg, MBC scientists study avian migration and pioneer novel ways to conserve migratory birds. This group's work on the conservation value of shade-grown coffee, for instance, led to the Bird Friendly coffee certification program that gives consumers the ability to support bird conservation through their everyday choices.

National Zoo ornithologists study communication and mating systems in a diverse array of bird species; lead efforts to breed and re-introduce Guam rails and Micronesian kingfishers, which were decimated by predatory brown tree snakes introduced to Guam; track the effects of the El Niño cycle and global climate change on migratory bird populations; study the reproductive biology of endangered birds of prey, such as the Spanish imperial eagle; and explore the ecology of birds in North America, the Neotropics, and Asia.

Beyond the Zoo, but often in collaboration with Zoo scientists, ornithologists from the Museum of Natural History, the Environmental Research Center, and the Tropical Research Institute conduct cutting-edge research on birds. In just the past decade the fascinating and sometimes dismal history of island-living birds, the ravages of the recent West Nile virus epidemic and invasive avian malaria, the ancient history of bird species in the West Indies, and what accounts for the fantastic diversity of South American birds have all been studied and reported. Smithsonian ornithologists have pioneered the use of new technologies, such as DNA sequencing, to solve these mysteries.

A primary goal of the new Smithsonian Ornithology Initiative is to establish a more integrated, enhanced research program across the Institution.

An equally important goal is sharing the results of Smithsonian bird research with the public and decision makers, in this way helping to foster the conservation of birds and their habitats around the globe.

To help with that sharing, Zoo staff are planning two new bird exhibits. Turning disaster into opportunity, the wetlands exhibit outside the Bird House, which burned in April 2004, will be transformed into a migratory bird exhibit. The National Zoo, home to a host of native and exotic migratory birds, is the perfect venue for people to come, learn, and wonder about bird migration. And what better place to do this than Washington, D.C., where decisions affecting migratory birds are made on a daily basis, and in Rock Creek Park, one of the first localities where declines in migratory songbirds were documented?

The second new exhibit will be indoors at the Bird House, where Zoo curators are developing an exhibit on mangroves. Growing between land and sea in the tropics and subtropics, mangrove forest wetlands are critical habitats for many migratory birds. They also shelter a host of other species, including shrimp and many fish. Unfortunately, mangrove habitats are being degraded by human activity and are disappearing at an alarming rate. They suffer from pollution, destructive aquaculture practices, and coastal development, and the species they support, including humans, suffer accordingly. Mangrove forests buffer the effects of storms and flooding on coastal communities. Indeed, some of the recent tsunami's incredible devastation would have been mitigated by the extensive mangrove forests that once lined much of the south and southeast Asian coast. This makes an exhibit at the Zoo that educates people about mangroves both important and timely. And it just so happens that Smithsonian scientists are on the forefront of research on mangrove ecosystems. (For more about this, visit SERC's new Caribbean Mangrove Island Virtual Tour at <http://www.mangroves.si.edu/Trail/VirtualTour.html>.)

It will take some time to design and build these new exhibits. We must also raise private funds to supplement congressional appropriations for construction, and will be looking to the always generous support of FONZ members for help. (You can donate online at <http://nationalzoo.si.edu/support/MakeDonation>.) In the meantime, I encourage you to visit the Bird House, with its marvelous collection of avian wonders. You can also find a wealth of information about birds on the Zoo's website at <http://nationalzoo.si.edu>, along with links to ornithological research throughout the Smithsonian. The Smithsonian is definitely "for the birds"—and we hope you will be too.

Sincerely,

David L. Evans

Under Secretary for Science, Smithsonian Institution,
and Interim Director of the Smithsonian's National Zoological Park

Notes&News



Zoo staff and giant panda fans hope that Mei Xiang (in back) and Tian Tian will parent a cub this year.

Animal News

Will the Smithsonian National Zoo's **giant pandas** (*Ailuropoda melanoleuca*), Mei Xiang and Tian Tian, deliver a panda cub in 2005? Zoo staff are hopeful but won't know if Mei Xiang is pregnant for at least a month.

The pandas' brief breeding season began in early March with the onset of Mei Xiang's estrus, the fertile period that for female giant pandas lasts only a few days each year. When Mei Xiang's hormones and behavior indicated that she was ready to mate, the pandas were brought together and separated several times in a series of encounters. Volunteers watched the pandas throughout, but the pair did not copulate.

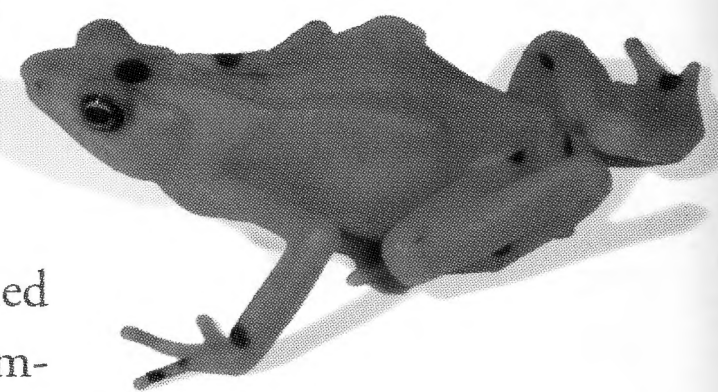
On March 11, with Tian Tian's interest waning and Mei Xiang's estrus nearing its end, Zoo veterinarians stepped in to give the pandas a helping hand. They performed a non-surgical artificial insemination on Mei Xiang by inserting Tian Tian's sperm into her uterus.

This same procedure has yielded pregnancies in other giant pandas, and it may work for Mei Xiang. Zoo staff will closely monitor her in the coming weeks, but won't know for sure if a cub is on the way until sometime between mid-June and September, because until then her hormonal profiles will be the same whether she is actually pregnant or experiencing a pseudopregnancy. For the latest updates on Mei Xiang and Tian Tian or to watch them on FONZ's panda cams, go to www.fonz.org/giantpandas.htm, or visit them at the Fujifilm Giant Panda Habitat at the National Zoo.

More than 130 species rely on **black-tailed prairie dogs** (*Cynomys ludovicianus*) for food or shelter, including endangered **black-footed ferrets** (*Mustela nigripes*), which prey almost exclusively on prairie dogs and live in their burrows. A new exhibit at the Small Mammal House shows these two species living side by side. The ferret can explore an aboveground habitat on the left side of the exhibit, or retreat down several underground tunnels built right up against the glass. The prairie dogs inhabit a nearly identical, and completely separate, aboveground habitat on the right, and because they have access to different underground tunnels than the ferret, the two species never encounter one another. Use the exhibit's touch-screen computers to learn more about these animals and the Zoo's highly successful breeding and reintroduction programs for black-footed ferrets.

Two of the Zoo's four **cheetah cubs** (*Acinonyx jubatus*) got their very own names on March 23, thanks to more than 13,000 people who voted in a cheetah-cub naming contest hosted by FONZ at www.fonz.org. The male's name is Askari, which in Swahili means "guard" or "watchman," and his sister's name is Imara, which means "strong" or "strength" in Swahili. One lucky contest entrant won a behind-the-scenes tour of the Zoo's Cheetah Conservation Station. Askari, Imari, their brother Damara, and their sister Hatima are popular: More than 50,000 people have visited them at the Zoo since their public debut in February.

Panamanian golden frogs' (*Atelopus zeteki*) populations are declining in the wild, but they are booming at the National Zoo. The Maryland Zoo in Baltimore loaned four pairs of these endangered amphibians to the Reptile Discovery Center this past winter and by the end of February all had produced fertilized eggs. The hundreds of tadpoles that hatched from the eggs will probably metamorphose into frogs between late spring and summer and may go on exhibit soon after.



Correction: In the January/February 2005 issue of ZooGoer, the lizard pictured on page 18 is a horned lizard (Phrynosoma sp.), not a desert iguana (Dipsosaurus dorsalis).

Events

It's not too late to buy tickets for two of the Zoo's most beloved annual events, Guppy Gala and ZooFari. For more information on all FONZ events or to purchase tickets, visit www.fonz.org/events.htm.

Guppy Gala

May 13—6 to 8:30 p.m.

Bring the kids to the Zoo for a night of fun tailored just for them. This year's festivities include entertainment, games, moon-bounces, and more. Tickets are \$20 for FONZ members and \$28 for nonmembers.

National ZooFari

May 19—6:30 to 10 p.m.

Taste gourmet food and fine wine, and dance under the stars. Tickets are \$120 for FONZ members and \$150 for nonmembers.

ZooMorning

June 18*—7:30 to 10:30 a.m.

*Please note that the date for this event, formerly called ZooNight, has changed since the ZooGoer calendar was printed.

At FONZ's free member appreciation event, get a behind-the-scenes look at how the Zoo gets ready for the day.

Sunset Serenades

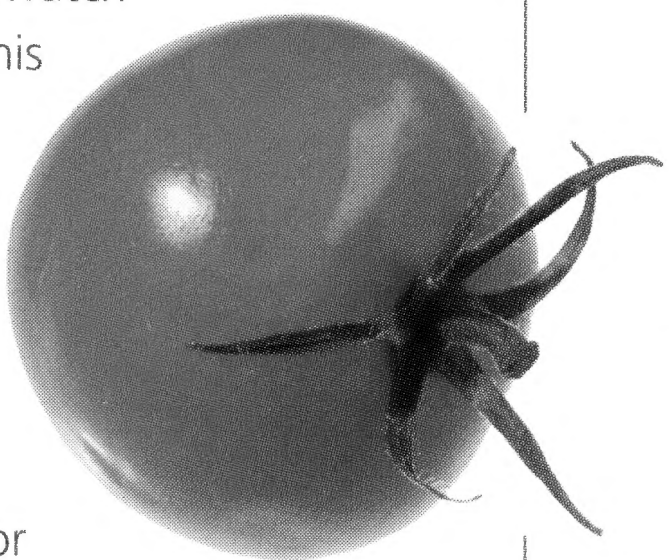
Thursdays, June 30 to August 4, from 6:30 to 8 p.m. Presented by AOL for Broadband. Enjoy six evenings of free musical entertainment on the lawn of the Zoo's Lion/Tiger Hill.

Lecture, Eat Here: Reclaiming Homegrown Pleasures in a Global Supermarket

May 26, 2005—Book signing at 7 p.m., lecture at 7:30 p.m.

Brian Halweil of Worldwatch

Institute discusses his new book, *Eat Here*, about a surging local food movement that is rediscovering homegrown pleasures and changing the way we eat. For more information or to RSVP, visit www.fonz.org/lectures.htm.



Call to Nominations

In accordance with our Bylaws, the Friends of the National Zoo Board of Directors is now soliciting nominations from the membership. Our volunteer Board plays an essential role in FONZ leadership and operation, and we rely on our members to recommend people with appropriate skills and talents to assist our efforts to support the Smithsonian's National Zoological Park.

I ask you to help by nominating to the Board persons who are interested in this very special community service. Nominations will be reviewed by the Board's Nominating Committee. The names of selected candidates will be forwarded to the membership for election. The criteria by which potential candidates are judged for nomination to the Board of Directors include: the candidate's strong interest in supporting zoological education, research, and conservation in accordance with the purposes of our corporation; leadership; experience or skills that are needed and that would directly benefit FONZ management and operations; and the willingness to commit significant amounts of time to participate fully in FONZ work and activities. Candidates must be dues-paying members of FONZ.

Much of the Board's work is accomplished through committees. For example: The Education Committee makes policies and provides guidance for FONZ-supported education, conservation, outreach, and Zoo-supported programs. The Membership and Development Committee develops policies related to membership activities and provides oversight for membership acquisition and retention programs and fundraising for the Zoo. The Guest Services/Concessions Committee formulates policies for FONZ concessions operations and visitor support services. Other Board committees include: Administration, Finance and Audit, and Nominating.

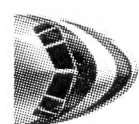
All Board members are expected to serve on committees and may be asked to attend one or more meetings or functions each month. Nominations may be made only by dues-paying members and must be submitted on an official FONZ Nomination Form with a biography of the nominee. Call 202.633.3072 to receive nomination forms or to discuss Board services with me or a member of the Board. The deadline for submitting nominations is June 16, 2005.

James M. Schroeder

James M. Schroeder
Executive Director

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Lilac-breasted Roller

(*Coracias caudata*)

Lilac-breasted rollers really know how to rock and roll. When courting mates or defending their territories, these African daredevils fly up high and then plunge into a death-defying dive. As they plummet, screaming, toward the ground, they rock their bodies and wings from side to side in a behavior called "rolling." A few feet before impact, they level out and repeat the stunt.





The Zoo's UNSUNG BIRDS

BY SHANNON LYONS

Chances are, you know what a flamingo looks like. Even if you haven't seen one of these graceful beauties in living color, you'd recognize a plastic replica standing stiff-legged on your neighbor's lawn. And how about a bald eagle? Most Americans haven't glimpsed our national bird in the wild, but they know exactly where to find one on the back of a dollar bill.

As celebrities of the bird world, the Smithsonian National Zoo's flamingos (*Phoenicopterus ruber*) and bald eagles (*Haliaeetus leucocephalus*)

enjoy a great deal of attention. Likewise, the Zoo's Micronesian kingfishers (*Halcyon cinnamomina cinnamomina*) and Guam rails (*Rallus owstoni*)—two species that are extinct in the wild—grab headlines as stars of the Zoo's conservation breeding programs.

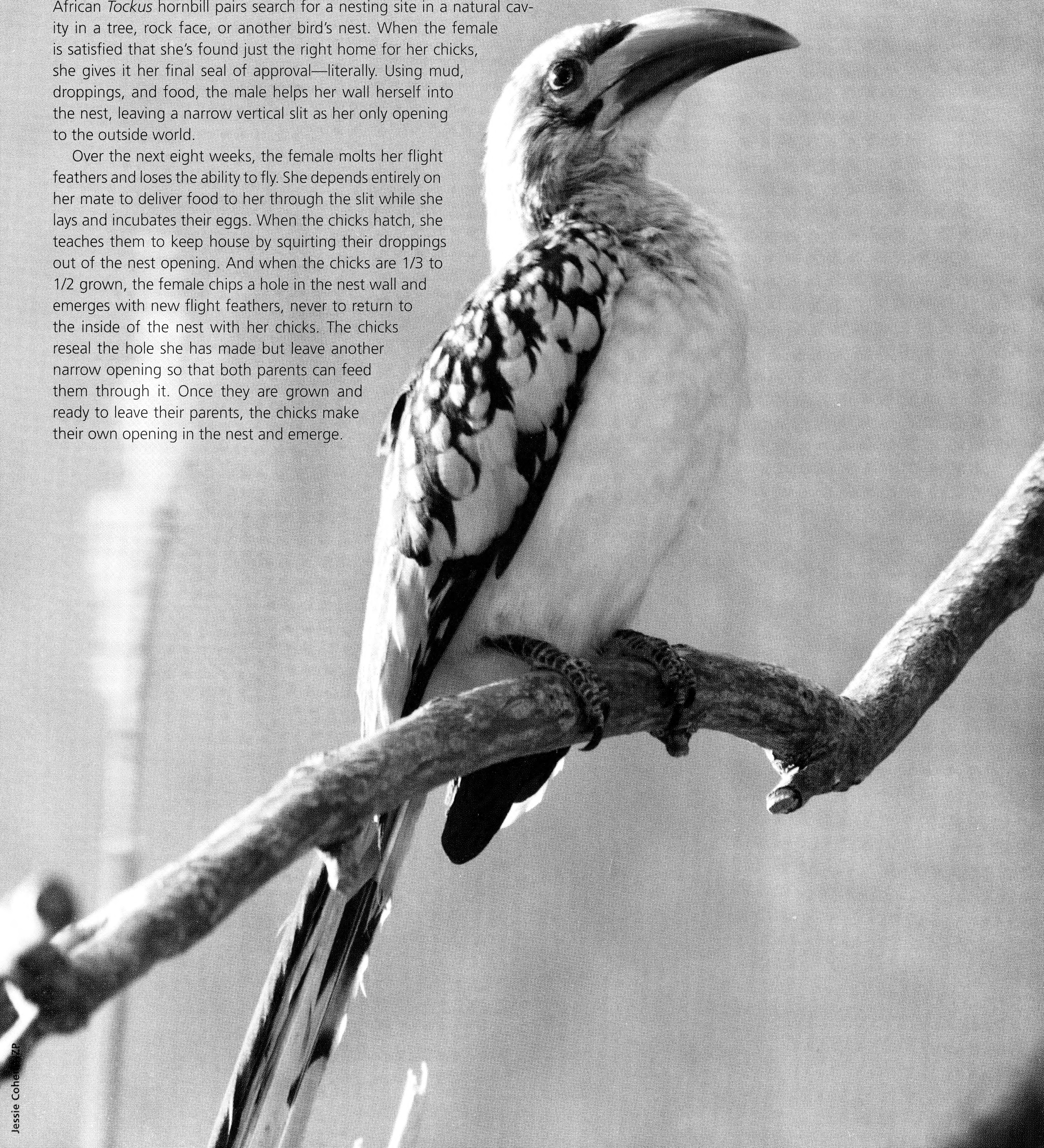
But beyond the hubbub over flashy pink feathers and reproductive renown, some fascinating Zoo birds wait in the wings for their moment in the spotlight. They're far from ordinary, and they deserve a little more ink. These are their stories.

Red-billed Hornbill (*Tockus erythrorhynchus*, pictured) and Von der Decken's Hornbill (*Tockus deckeni*)

Hornbills are anatomical oddballs. Unlike any other bird in the world, their first two neck vertebrae are fused together. And their kidneys have only two lobes, while all other birds' have three.

But it is hornbills' bizarre nesting behavior that really sets them apart. African *Tockus* hornbill pairs search for a nesting site in a natural cavity in a tree, rock face, or another bird's nest. When the female is satisfied that she's found just the right home for her chicks, she gives it her final seal of approval—literally. Using mud, droppings, and food, the male helps her wall herself into the nest, leaving a narrow vertical slit as her only opening to the outside world.

Over the next eight weeks, the female molts her flight feathers and loses the ability to fly. She depends entirely on her mate to deliver food to her through the slit while she lays and incubates their eggs. When the chicks hatch, she teaches them to keep house by squirting their droppings out of the nest opening. And when the chicks are 1/3 to 1/2 grown, the female chips a hole in the nest wall and emerges with new flight feathers, never to return to the inside of the nest with her chicks. The chicks reseal the hole she has made but leave another narrow opening so that both parents can feed them through it. Once they are grown and ready to leave their parents, the chicks make their own opening in the nest and emerge.





Red-legged Seriema

(*Cariama cristata*)

For snakes and small vertebrates, death by seriema (pronounced "ser-ee-ee-mah") is a particularly nasty experience. A seriema smashes unwieldy prey against a rock or the ground to incapacitate it, then delivers the coup de grâce and swallows it whole. Escape is unlikely for the hapless quarry, because these terrestrial birds can run up to 25 miles per hour—far faster than any snake can slither.

Although seriemas eat a variety of arthropods, some vegetable matter, and even rats and bird chicks, it is their taste for serpents that endears them to South Americans. People are so grateful to seriemas for dispatching snakes that they have magnified the birds' skills beyond credibility. Some say a single seriema can rid an area of snakes altogether. Others believe the birds are immune to snake venom, which is simply untrue.

Red-legged seriemas may be less-than-stellar varmint hunters, but they make excellent home security systems. They are certainly loud enough: Their bizarre call, which some listeners describe as a cross between a canine yelp and a turkey's gobble, carries for more than a mile over the grasslands of Brazil, Bolivia, and Argentina. And they're wary too. Farmers keep them with domestic fowl to keep an eye out for predators and sound an alarm call if danger is on the horizon.



Jessie Cohen/NZP

Green Magpie

(*Cissa chinensis*)

You may be surprised to find the Zoo's green magpie looking a little blue. Not to worry, though. The feathers of this Southeast Asian species often turn turquoise in zoos and in the wild. Why? Scientists aren't positive, but it may have something to do with carotenoids, or natural fat-soluble pigments, in the birds' feathers.

Perhaps the magpies are *what they eat*. If the amount of carotenoids in their diets changes, the color of their feathers might change accordingly. This is true for flamingos, which get their vivid pink coloration from the carotenoid-rich algae and crustaceans they consume. Or maybe sunlight is the catalyst. Prolonged exposure to it may fade the yellow carotenoids in green magpie feathers and give the remaining blue pigments their own day in the sun.



Joe McDonald

Hamerkop

(*Scopus umbretta*)

Think only sharks are called hammerheads? Think again. This bird has such a strange crest of feathers on its head that it resembles the business end of a claw hammer, and so it is called hamerkop—meaning hammerhead—in Afrikaans, a South African language.

Hamerkop nests are like shorefront condominiums for wildlife in the marshes and estuaries in Madagascar, southern Arabia, and Africa. These domed domiciles are the largest of all bird nests at nearly five feet in circumference. Hawks, owls, other birds, mongooses, and some reptiles steal the nests from hamerkops or take them over once they are abandoned. Small birds and honeybees even attach their own nests to the enormous structures while the hamerkops are still in residence.

With their open-door nesting policy and plain-Jane plumage, hamerkops seem harmless compared to the marine predators that share their name. But some people believe otherwise. In Zulu and Hottentot cultures, hamerkops are sinister creatures that bring tidings of death and disaster to anyone who dreams of them or sees one flying over a house. In local legend they are also tied to witchcraft, and are said to embody vanity and futility. Their bad rap may protect hamerkops from human hunters, who out of fear have given the birds a wide berth.



Emu

(*Dromaius novaehollandiae*)

This Father's Day we salute one of the bird world's most devoted papas: the emu. When his freewheeling mate lays a clutch of avocado-colored eggs and then runs for the hills, the male emu hatches and raises their chicks all by himself.

Fatherhood requires a great deal of patience and sacrifice from these birds. During the 56 days of incubation, males do not leave their eggs, not even to eat, defecate, or drink, though they may sip droplets of morning dew that form on nearby grasses. Luckily they come to the nest prepared, having already built up extra fat stores and lowered their body temperatures to stave off water loss. After the chicks hatch, they remain under their father's protective care until they are six or seven months old and can fend for themselves.

Although emus are pictured in Australia's coat of arms along with red kangaroos (*Macropus rufus*), their native country did not always hold them in such high esteem. In 1932, when an estimated 20,000 hungry emus devoured valuable crops in Western Australia, the Royal Australian Artillery waged war against them. But the artillery's machine guns had little effect on the flightless emus, which scattered quickly out of shooting range. In a week there were fewer than 20 emu casualties, and the discouraged government called off the Emu War.

Prothonotary Warbler

(*Protonotaria citrea*)

This sweet-singing migrant helped Richard Nixon expose a lie and, ultimately, achieve the presidency. Nixon became a household name in 1948 when he presided over the House Un-American Activities Committee's hearing for suspected communist spy Alger Hiss, who was also a State Department official and amateur ornithologist. Hiss denied knowing his accuser, *Time* magazine editor Whittaker Chambers. But the jig was up when, in separate interviews, both men mentioned Hiss' sighting of a prothonotary warbler near the Potomac River, proving they were well acquainted. Hiss was indicted for perjury, and the case propelled Nixon, who was a congressman at the time, into the Senate and on his way to the White House.

Prothonotary warblers breed in southeastern North America and winter in mangroves and other habitats in Central and South America. You won't find them in any Zoo exhibit—yet. But they may one day add a flash of gold to a new mangrove exhibit being planned for the Bird House. Although the list of the exhibit's bird species has yet to be finalized, prothonotary warblers are being considered, as are the mangrove birds already in the Zoo's collection: scarlet ibises (*Eudocimus ruber*), cattle egrets (*Bubulcus ibis*), boat-billed herons (*Cochlearius cochlearius*), and roseate spoonbills (*Ajaia ajaja*). The Zoo's Migratory Bird Center's work with prothonotary warblers will be highlighted, along with other Smithsonian science relating to mangroves.





Magnificent Bird of Paradise

(*Diphylloides magnificus*)

The Zoo's birds of paradise are showstoppers. The magnificent bird of paradise, living up to its name, flaunts a gaudy jumble of Mardi Gras colors and a curlicue tail that could double as a handlebar mustache. And when the male Raggiana birds of paradise mature, they sprout a cascade of wispy red feathers that rivals a fireworks display.

In the 16th century, birds of paradise's lavish plumage enthralled Europeans visiting New Guinea. These explorers and traders obtained stuffed bird of paradise skins from hunters who had previously removed the birds' feet and legs, possibly to appease local superstition. The awed Europeans believed the birds were legless when alive, that they never landed or perched on the Earth, and that they dwelled in the heavens. Even Linnaeus was fooled; in 1758, he named the largest species *Paradisaea apoda*, meaning "of Paradise" and "without feet."

The birds' mystique certainly impressed poets and storytellers. In 1795, Samuel Taylor Coleridge dedicated a few lines to them in his poem "The Æolian Harp": "Where Melodies round honey-dropping flowers,/ Footless and wild, like birds of Paradise,/ Nor pause, nor perch, hovering on untam'd wing!" And in his 1909 short story "Rus in Urbe," O. Henry's protagonist describes his lady love as having "a soul above ducks—above nightingales; aye, even above birds of paradise."

Raggiana Bird of Paradise

(*Paradisaea raggiana*)





King Vulture

(*Sarcorhamphus papa*)

There are seven species of New World vultures, but only one can be king. With its regal cape of white feathers, a six-foot-plus wingspan, and the most powerful vulture beak this side of the Atlantic, the king vulture reigns supreme in tropical forests from Mexico to Argentina.

King vultures are also notable for what they lack: olfactory prowess and a voice. Not all vultures have an extraordinary sense of smell, and king vultures seem to have none whatsoever. In fact, they probably rely on keen-nosed vultures in the genus *Cathartes* to find their meals for them. They also lack a syrinx—or voice box—and so are unable to sing or call. Their vocal expressions are limited to grunts, hisses, and whistles.

Scavenging is an exhausting enterprise, so king vultures must conserve energy. They rarely flap their wings, soaring instead on currents of warm air called thermals. And they don't squander energy fighting over food; they allow smaller and weaker vulture species to eat alongside them.

The Mayans held king vultures in special regard, and portrayed them as deities in their manuscripts.



ADVENTURES IN BIRDING

at the National Zoo

Bird lovers, take note: You need not don a safari hat or trek through remote jungles to find rare and exotic birds from around the world. Look no farther than the Smithsonian's National Zoo, where, at your leisure, you can see more than 100 bird species from six continents.

Where better to start than the Bird House—the undisputed epicenter of avian exhibits at the National Zoo. The inside of the building is a birder's delight, with so many birds under one roof that it resembles a living, breathing bazaar of colorful displays from distant lands. Where else on Earth is the South American toco toucan, with its preposterous yellow bill, a close neighbor of the African pygmy falcon and the rare Micronesian kingfisher? Nearly invisible barriers make it easy for you to see and hear the birds here; and in the Indoor Flight Room you can walk among a dozen species, including tanagers, doves, and a sunbittern flying free through a jungle habitat.

You'll find a bird to suit any mood in the open-air enclosures outside the Bird House. For a dose of serenity, pause beside elegant

cranes, revered in some cultures as sacred. Need an eye-opener? The hot pink plumage of the scarlet ibis is sure to wake you up. The ducks' comical waddles are good for a chuckle, and thrill seekers should stop to see the deadliest Zoo bird—the double-wattled cassowary—which can kill a person with its fierce kicks and sharp claws.

In temperate weather from May to October, visit the Great Flight Exhibit, a vast outdoor enclosure with a pond and waterfall that features Asian birds on the wing and a peafowl strutting its stuff. Or, to get a little closer to one of the Bird House's most peculiar inhabitants, meet a kiwi, a flightless bird from New Zealand, at 11 a.m. any Monday, Wednesday, or Friday of the year.

A thorough birding expedition does not end at the Bird House, however; feathered creatures can be found throughout the Zoo, sometimes cohabiting with other species. Near the top of the hill, an emu lives with kangaroos; farther down at the Small Mammal House, Von der Decken's hornbills share space with black-and-rufous giant

elephant-shrews. Hummingbirds hover among the butterflies in the Pollinarium, and free-flying tropical birds, including a macaw, enliven Amazonia.

Beaver Valley is the place to see North American raptors, including bald eagles, red-tailed hawks, and Harris' hawks. If you yearn to learn more about them, listen to a keeper talk and watch an eagle feeding every Saturday and Sunday at 2 p.m. at the Bald Eagle Refuge.

As you travel from one exhibit to the next, keep an eye out for wild birds. Woodpeckers, hawks, and many others are year-round Zoo residents, while some, like the black-crowned night heron, are migrants that make the Zoo their seasonal home. Behind the scenes, Zoo scientists at the Migratory Bird Center study such migrants in the U.S. and abroad.

To plan your birding adventure at the National Zoo, to learn more about the birds you saw here, or to get the latest scoop on Zoo scientists' work with birds, visit www.fonz.org. It's the ultimate luxury—birding from the comfort of your favorite armchair.



REPTILES *to* ROBINS

Scientists have long recognized that modern-day birds and reptiles share a common ancestor. Both groups lay shelled eggs and have scales (in birds, confined to the legs), nucleated red blood cells, and a number of skeletal similarities. The famous fossil of the Jurassic bird *Archaeopteryx* (meaning “ancient wing”) was so reptilian in appearance that experts initially mistook it for a dinosaur.

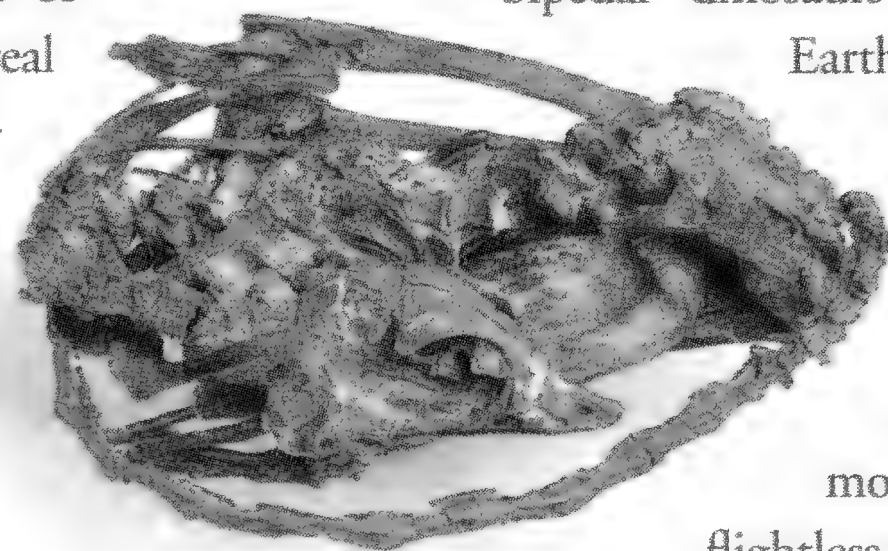
The concept of evolution was still new in 1868, when Thomas Huxley, one of Darwin’s most ardent champions, first suggested that *Archaeopteryx* was a link between dinosaurs and modern birds. Since then, a wealth of fossil evidence has supported Huxley’s theory, identifying traits in dinosaurs that earlier had been associated only with birds. Paleontologists’ most recent discoveries include a *Tyrannosaurus rex* predecessor covered with fine down, a dinosaur

with four feathered wings, and a small slumbering dinosaur (*Mei long*, above) preserved with its head tucked under a front limb in bird-like repose.

Yet despite the striking fossil evidence, there is still no consensus over birds’ dinosaur ancestry. A few scientists contend that birds did not evolve from dinosaurs but rather from a group of small, four-legged arboreal reptiles called the thecodonts. This is the same group from which the dinosaurs probably descended, but thecodont theorists argue that bird ancestors inhabited the Earth in the mid-Triassic Period, about 20 million years before the first dinosaurs appeared in the late Triassic and early Jurassic Periods.

These scientists attribute similarities between dinosaurs and birds to convergent evolution—a process by which unrelated organisms evolve similar anatomical structures independently.

However, the prevailing theory proposes that birds descended from a group of dinosaurs called theropods—carnivorous, bipedal dinosaurs that inhabited the Earth from the late Triassic Period until the end of the Cretaceous Period, about 220 to 65 million years ago. The theory traces modern birds to a group of flightless theropods called maniraptorans. These dinosaurs were swift runners with hollow bones, three-clawed toes on each limb, and sharp teeth. In the mid-1990s, scientists discovered one more



extraordinary detail: Theropod dinosaurs were feathered. Paleontologists continue to unearth fossils proving that some theropods were entirely covered in downy fluff, while others sported feathers that are structurally identical to those of modern birds.

Feathers serve a variety of purposes. Modern birds insulate their bodies with down, flourish their plumage to communicate, blanket feathers over eggs during incubation, and, of course, use feathers to fly. But why did flightless dinosaurs have them? Some scientists speculate that feathers originated in dinosaurs to regulate body temperature. Just as in living birds, dinosaur feathers would have offered protection from cold and prevented overheating in the sun. It follows from this theory that feathers were co-opted for flight further down the evolutionary road.

Precisely how reptiles first took to the air presents yet another enigma. Did

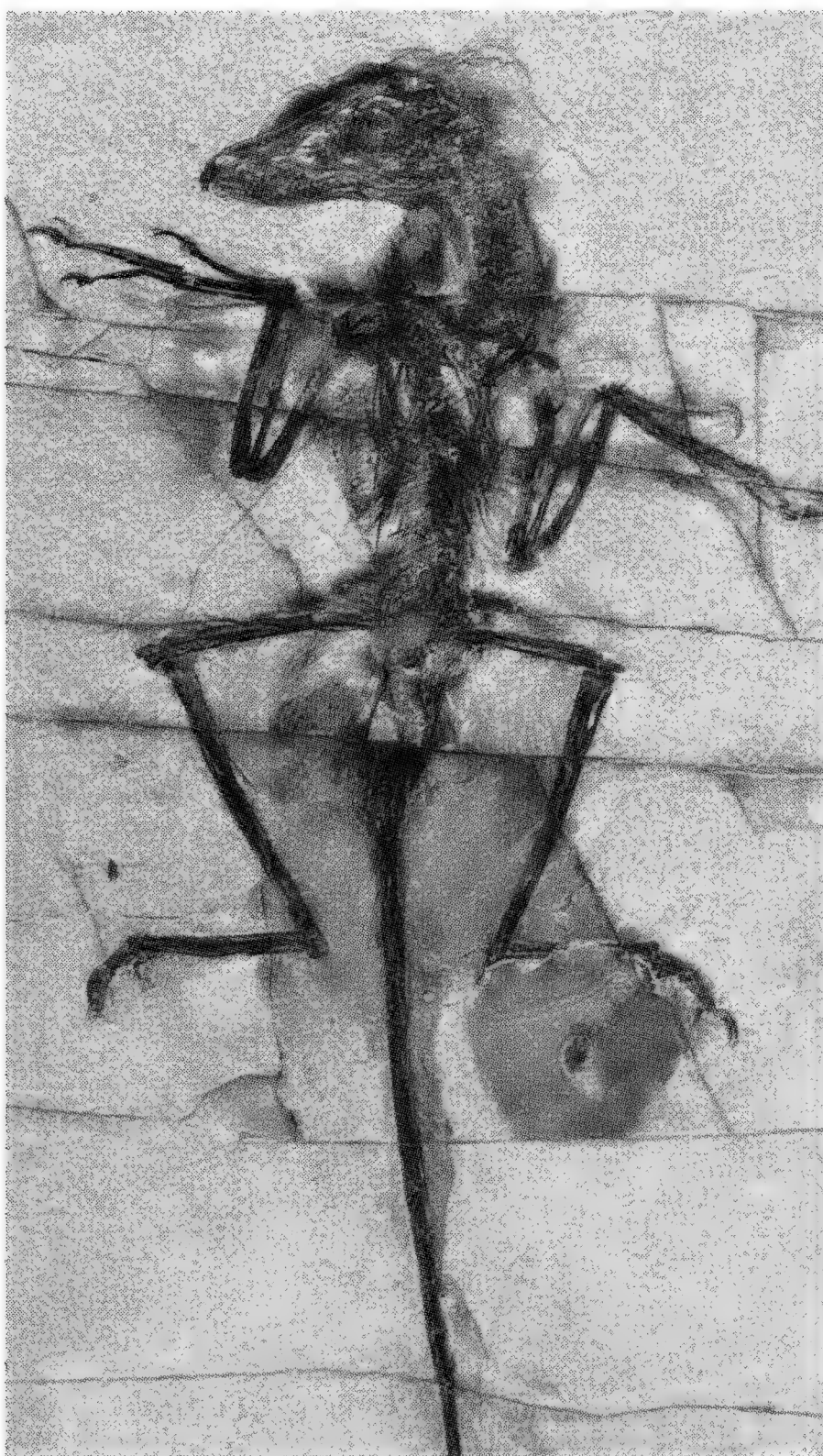
they begin with a running start from the ground or by gliding out of ancient tree-tops? Scientists have debated the ground-up and trees-down theories for a century. Proponents of the ground-up hypothesis posit that the arm motions of small dinosaurs grasping after prey resembled a flight stroke. Eventually, dinosaurs running after prey may have gained enough speed from their hind limbs and thrust from the grasping motion of their forelimbs to become airborne. Alternately, arboreal flight theory proposes that tree-dwelling reptiles initially glided from branch to branch through the forest canopy, and only later flapped themselves into powered flight.

The 2003 discovery of a dinosaur called *Microaptor*, which had four feathered wings, favors the arboreal flight hypothesis. Long aerodynamic feathers on the hind limbs, such as those covering *Microaptor*'s legs, might have evolved in arboreal dino-

sauers to slow their descent should they fall from trees. Furthermore, wings on the hind limbs would have dragged through the dirt, making a terrestrial take-off unlikely. Upon discovering *Microaptor*, scientists took another look at *Archaeopteryx* and noticed, for the first time, vestiges of hind wings on its legs. Gradually, intermediate features of this kind lead scientists closer to understanding the evolutionary path traveled by modern birds.

In an 1860 letter to Charles Kingsley, a clergyman and Darwin supporter, Thomas Huxley warned, "... be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses nature leads, or you shall learn nothing." The debate surrounding bird evolution rages on, leaving scientists to humbly follow the fossils.

—Deborah Press



Fossils show the evolutionary links between dinosaurs and birds. Opposite page: An artist's rendering and fossil of *Mei long*, a non-avian dinosaur that slept in a bird-like pose. This page: This dromaeosaur (fossil on the left), also a non-avian dinosaur, was covered in filaments and fibers that resemble the feathers of modern-day birds (right).



Green iguanas
(*Iguana iguana*)
menace Floridians'
backyards by
chomping garden
plants and sullyng
pools and patios.



FLORIDA'S Creeping Crawlers

BY HOWARD YOUTH

Like the millions of people who migrate to Florida to vacation or live, iguanas—and many other reptiles—also find Florida's warmth and exotic greenery very inviting.

Since their first appearance in the 1960s, after escaping from zoos or being freed by pet owners, green iguanas (*Iguana iguana*) seem to be right at home in the Sunshine State, even though they originally hail from places well to the south.

"If it snowed in Miami, we wouldn't have an iguana problem anymore," says Kenneth Krysko, a herpetologist with the Florida Museum of Natural History at the University of Florida in Gainesville. "In the Keys, you see multi-million-dollar homes but notice something doesn't look quite right," he says. "Then you see that all the beautiful flowering plants have chicken wire around them. A big male green iguana gets more than five feet long and he's got to eat."

Krysko patrols the state, documenting new reptile invaders that have arrived from all corners of the globe. With his noose-fitted fly rod and bucket of crickets for bait, he's been reeling in not only green iguanas, but a real menagerie.

Over the last 40 years or so, Florida's population has grown quickly, as have international travel and trade, including the pet trade. At the same time, the number of new reptiles popping up all over the state has grown. They arrive in plant shipments, in crates, or in travelers' cars. Or they escape from pet dealers or owners, or are released on purpose. From small to goliath, these scaly new arrivals have turned the heads of scientists, gardeners, pet owners, and home owners.

Today close to 40 exotic, or non-native, reptile species breed in Florida, and new species keep showing up, despite long-standing regulations that prohibit introductions. More than 30 of these are lizards, ballooning the state lizard list from the original 16 native species to about 50 and growing. Krysko and other scientists are just starting to narrow their focus on the ecological impact of the state's new "herps"—introduced reptiles and amphibians—and they have found that some may pack a real wallop. Some, like the iguanas, also leave many residents crying, "Not in my backyard!"

Iguanas by the Pool

From Palm Beach to Key West, the iguana population seems to be growing beyond control. Krysko, half-joking, promotes marketing the introduced iguanas as prime table fare. "There are some great recipes out there for iguanas, so why don't we go out and get [the reptiles], humanely?" he says, adding, "There's a little meat on the tail but a large portion on the legs." Iguana meat—which like so much other exotic game is touted to taste like chicken—already features prominently on rural tables throughout the lizard's native range in Mexico, Central and South America, and the Caribbean islands. Despite its popularity in the tropical countryside, iguana has yet to become an important part of Miami restaurant cuisine.

It's hard to know how many iguanas now live and breed in southern Florida, but on Key Biscayne alone, Krysko's colleagues hauled out more than 1,000 in 2003. Many homeowners find the sight of the large, scaly lizards distasteful, if not because of their appearance, then due to their habits. To date, no one has documented these fast-growing omnivores' impact on native plants, but landscapers bemoan the loss of ornamental hibiscus and other flowers. "Any pretty flower, they're going to eat it," says Krysko, who has noosed and wrestled individuals out of Miami's Fairchild Tropical Botanic Garden, where ten to 20 may be found in one tree. "And they defecate everywhere—on people's docks, in their pools...everywhere," adds Krysko.

Krysko and his colleagues also noticed some troubling behavior by the introduced black spiny-tailed iguana (*Ctenosaura similis*), a stripy Central American species that now proliferates in the Miami area and in a few residential areas in southwestern Florida. The scientists

Today close to 40 exotic, or non-native, reptile species breed in Florida.



Native green anoles (above) struggle to compete with non-native brown anoles (see opposite page) for food and habitat.

recently documented this lizard eating a state-endangered plant, the Curacao bush (*Cordia globosa*). They also found black spiny-tailed iguanas inhabiting gopher tortoise (*Gopherus polyphemus*) burrows and eating many of the same plants sought by this declining and protected native species.

Brown Versus Green

These days, the most commonly seen lizard in southern Florida is not the green iguana, but a far smaller—and even more prolific—introduced animal, the brown anole (*Anolis sagrei*). Tan to chocolate-brown in color, depending upon temperature and mood, brown anoles rarely grow to be more than eight inches long. Males often perch head-down low on tree trunks and other vantage points, flashing their yellow-rimmed scarlet throat fans, or dewlaps. Diamond-backed females lurk in nearby vegetation. Many Floridians bemoan the loss of the once-abundant native green anole (*Anolis carolinensis*), which used to be all over their backyards but now seems to have vanished in the wake of the introduced brown anoles.

Native to Cuba and the Bahamas, brown anoles now also inhabit virtually all of peninsular Florida, coastal cities in Louisiana, Texas, and Georgia, some Caribbean islands where they are not native, and also sites in Hawaii and Taiwan. Jason Kolbe, a graduate student at

Washington University in St. Louis, and his colleagues traced the origins of recently established brown anole populations in Taiwan, Hawaii, Grand Cayman, and Grenada not to the brown anole's native islands, but to Florida. "The real key was the mixture of genetic variants present within Florida populations that do not occur together in the native range," says Kolbe, "and that these mixtures also exist in Hawaii and Taiwan." Obviously, the lizards have not traveled from Florida on their own. "My best guess is that it's a combination of various factors," says Kolbe. "They could be coming and going on exotic plants and can survive days to weeks during shipment. The pet trade is likely a source as well."

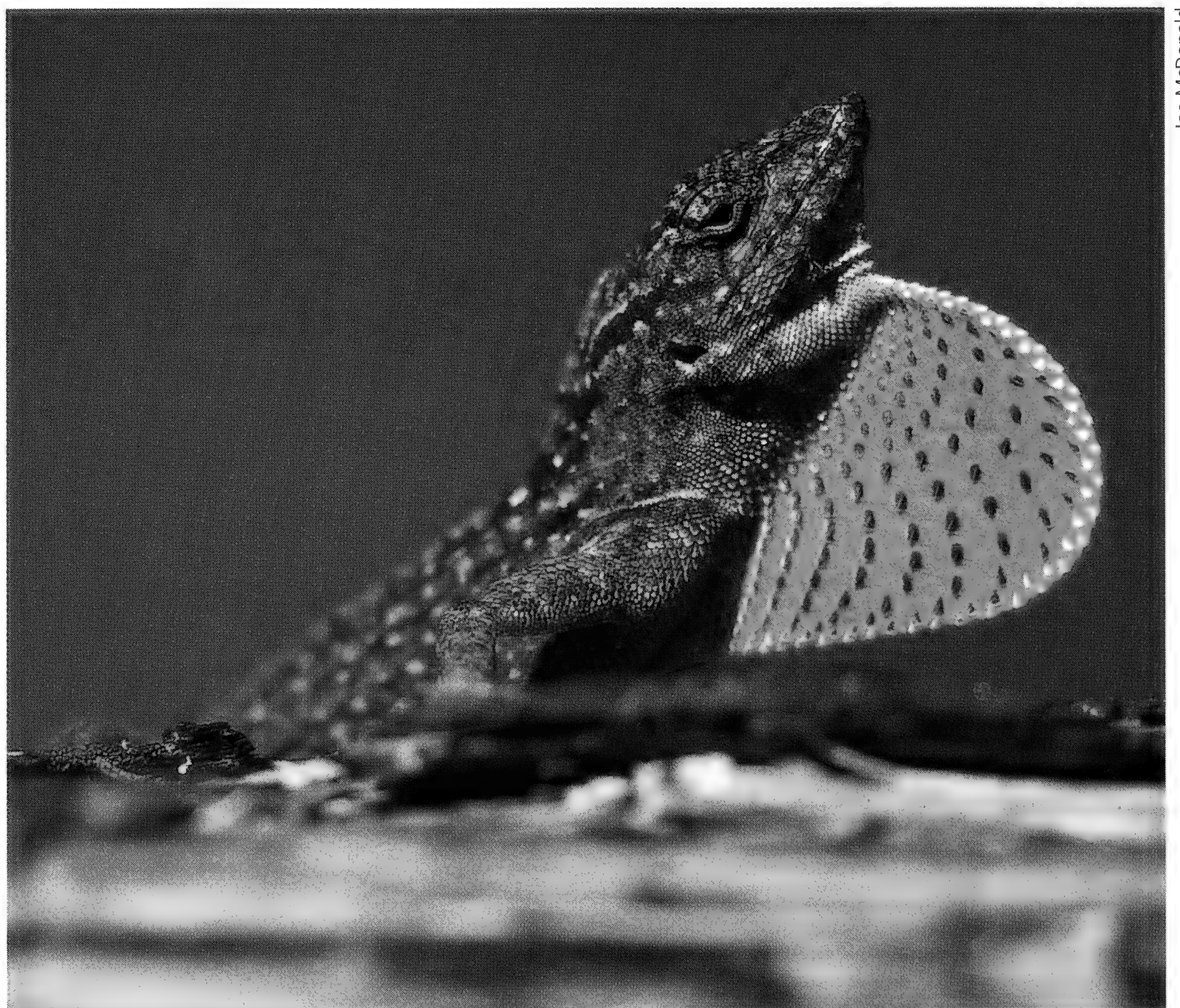
In their study, the results of which were published in *Nature* in September 2004, Kolbe and his colleagues wrote that Florida has weathered at least eight brown anole invasions. The scientists believe that the well-entrenched anoles spring from "blending genetic variation from different geographic source populations and producing populations that contain substantially more, not less, genetic variation than native populations." They believe that this genetic variation may make brown anoles "particularly potent sources for introductions elsewhere." Isolated introductions seldom come on so strong, because they suffer from genetic bottlenecks without infusions of new blood.

Herpetologists note some morphological differences between Florida brown anoles and those in Cuba, such as larger size in some areas of Florida. But Kolbe thinks it's far too soon to entertain thoughts of a new Florida brown anole species already existing, although there might be one in the making. "The trick there is that we'd have to stop introducing them, but we're still introducing them all the time." If the peninsular population were isolated, says Kolbe, a unique Florida anole species might evolve, given enough time.

The brown anole is one of Florida's earliest known reptile imports, first found in the late 1800s on Key West, probably after stowing away on cargo ships. After several more introductions, brown anoles formed satellite populations that eventually merged, then really kicked into gear from the 1940s through the 1970s. Since then, anoles likely filled in the gaps by "vehicular rafting"—hitching rides on the undercarriages of cars and in ornamental vegetation trucked north—and via introductions from Cuba. They have even been seen catching rides on windshield wipers. One observation that points to vehicular rafting came in 1996, when University of Tennessee Ph.D. candidate Todd Campbell found brown anoles on northbound interstate highway rest areas but not on those serving southbound traffic across the highway.

When he made his rest-stop observation, Campbell, now an assistant professor and ecologist at the University of Tampa, was studying brown anole colonization in a different area—on green-anole-inhabited islands, or piles of sediments made from dredging channels, off of Cape Canaveral. In 1995, he introduced brown anoles to three of these islands, and also studied three control islands inhabited only by native greens. While green anoles were found at all levels and types of vegetation at the start of the study, by 1998 brown anole populations, which started with either 40 or 80 individuals, "increased dramatically and became dense in all habitat types within the study period," wrote Campbell in a summary of his study published in the *Anolis* newsletter in 1999. Meanwhile, green anole populations on brown-inhabited islands plummeted. What's more, greens on islands with browns only occurred in the most densely vegetated areas, and they had shifted to higher perches, but on the control islands without browns, green anoles were still skittering all over.

Why are browns outcompeting greens? "A lot of factors are operating here at the same time," Campbell says. "Among them is this 'double whammy' of [brown anoles] eating another lizard's prey items and its hatchlings. This can knock a species down pretty quickly," he says. "Green anole hatchlings have to run a gauntlet of brown anoles all the time. They live near the ground and are directly exposed." Campbell stresses that no one knows for sure, but he wouldn't eliminate the possibility that, to survive, young green anoles learn to avoid areas frequented by brown anoles. They may carry this avoidance



Joe McDonald

First introduced to Key West in the 1800s, the brown anole may now have larger and more genetically diverse populations in Florida than its native cousin, the green anole.

behavior into adulthood, when they choose to perch higher than brown anoles. While adult green anoles occasionally feed on young brown anoles, browns occur at far higher densities: "Brown anoles can reach densities of one lizard per square meter," says Campbell. "That's 10,000 lizards per hectare [2.47 acres]."

Can the green anole survive the onslaught? "Floridians grew up with the green anoles all over the outsides of their houses. Now they see only brown anoles. But usually the green anoles are just higher up, not gone," says Campbell. Thickly vegetated gardens provide urban havens for green anoles, and at least for now, outside the most urbanized areas, brown anole densities are lower and many green anole populations continue to thrive.



This juvenile Nile monitor may grow to be seven feet long.

Joe McDonald

escaped from pet breeders or some that were intentionally released by stressed pet owners or by dealers hoping to establish stock in the wild that could later be recaptured.

Like many other successfully introduced species, Nile monitors are habitat and diet generalists. Armed with formidable claws and muscular tails, they readily dig in soil to find buried eggs or to enter animal burrows. Strong swimmers, they spend much of their active time at

Nile monitors grow up to seven feet long and can weigh up to 30 pounds. They can inflict serious injuries with their jaws and lash attackers with their formidable tails and claws, although if found in the wild they usually flee rather than confront people. The thriving Cape Coral monitor population likely originated either from animals that

the water's edge or in water, chasing prey or escaping Campbell and other dangers—hatchlings are vulnerable to large raptors, alligators, dogs, cats, and even adult Nile monitors. Over the past year and a half, Campbell and his colleagues have captured and euthanized more than 80 monitors. They checked the animals for introduced parasites ("They were incredibly clean," Campbell told me), examined the lizard's reproductive tracts for eggs and other signs of breeding, and pored over the stomach contents.

A Potential Nightmare in the Mangroves

When the staff of NBC's "Today" show called and asked Campbell to appear on national television, they didn't want to hear about small, feisty lizards. Campbell was brought on the air to discuss some of his other work—specifically his efforts to locate and capture Africa's longest lizard, the Nile monitor (*Varanus niloticus*), on Cape Coral, a suburbanized peninsula just southwest of Fort Myers.

Toxic Toads & Tyrannical Treefrogs

Florida's first known amphibian invader was the inch-long greenhouse frog (*Eleutherodactylus planirostris*), a soil-colored little creature that likely made its way over on plant shipments from Cuba in the mid-1800s. Greenhouse frogs are now an inconspicuous but widespread addition to the state fauna. The state's two other well-established exotic amphibians—the cane toad (*Bufo marinus*) and Cuban treefrog (*Osteopilus septentrionalis*)—make a far greater impression on Floridians. The toad grows to the size of a cow patty and eats almost anything that moves, including native snakes and frogs and cockroaches and beetles that it laps up while sitting beneath street lights at night. Unlike most amphibians, it scavenges too, eating pet food and sometimes even dog feces.

After decades of introductions, the cane toad, a native from southern Texas south

well into South America, is now the world's most widely introduced amphibian (followed closely by the American bullfrog). The University of Florida and sugar cane growers intentionally released them in Florida several times to control insects that were eating cane crops, but an accidental release at Miami International Airport, likely in the 1950s, really helped them take off. Their impressive size and distribution aside, these flabby invaders are also highly toxic. "Every life stage, from egg to tadpole to adult, is toxic to some degree," says Kevin G. Smith, a University of Tennessee Ph.D. candidate who has studied the toxicity and Florida distribution of both cane toads and Cuban treefrogs.

The toads seem to know they are dangerous. "They'll lean and point their glands at you," says Smith, who adds that while the parotid glands behind the animals' eyes hold

a concentration of the toxin, agitated toads exude small amounts all over their skin. "It looks like they're sprinkled with milk," says Smith, who has caught many a toad for his studies. Similar to digitalis, a cardiac stimulant made from the dried leaves of foxglove plants, the toad toxin attacks the heart of a predator. "Basically, it can induce a heart attack. With many dogs, it happens right away," says Smith. "Not all dogs die after biting them," says Florida herpetologist Kenneth Krysko, "but I recently had an 80-pound rottweiler die in my arms."

Australian conservationists are quaking in their boots as they document the cane toad's march across tropical northern Australia and into some of the country's most biologically diverse wild areas. Many fear that populations of native snakes and other predators will die out when they attempt to prey on the toads. Australian monitors have

Items discovered on the monitors' menu were varied, and sometimes a bit surprising. "We found a lot of cockroaches, mangrove tree crabs, snails, clams, members of five frog species including the Cuban treefrog [an introduced species], native glass lizards, birds [black feathers—perhaps grackles], fish, some mammal hair, a whole pygmy rattlesnake, and a wasp nest," says Campbell. "We also found a whole heck of a lot of brown anoles and their eggs. That's a lot of [brown anole] biomass available to a [Nile] monitor and sure enough, they eat them. And they eat a lot of them." Campbell cites a similar example on the Pacific island of Guam, where introduced brown tree snakes (*Boiga irregularis*) decimated endemic wildlife and continued to flourish, feasting on two prolific introduced lizard species.

Nile monitors favor wetlands but they also have been popping up in the suburbs, chasing after pond goldfish and potentially posing a threat to small dogs and cats. The monitor's catholic tastes concern conservationists like Campbell. He, Krysko, and their colleagues Kevin M. Enge, Kraig R. Hankins, and F. Wayne King recently published the first paper on the species' ecological status in Florida, which appeared in *Southeastern Naturalist* in 2004. In it, the authors ponder the lizard's potential impact on native fauna and plot out areas where monitors have been found. They write: "Presently, the natural history of *V. niloticus* in Florida has not been documented, but information gathered from studies in Africa indicates that this exotic species may pose a serious

Nile monitors have been popping up in the suburbs, potentially posing a threat to small dogs and cats.

threat to native wildlife, particularly if it expands its range."

"They're not limited by anything and they're definitely breeding," says Campbell, "We've caught only 80. There are probably in the high hundreds or thousands out there. They are currently highly localized in the Cape Coral area, but we've also had sightings in some troublesome places, such as nearby Pine Island. If they breed there, they would be very difficult to eradicate."

The effect on local wildlife is a concern. "The monitors are already right in the heart of the largest burrowing owl [*Athene cunicularia*] population in the state," says Campbell. So far,

there is no evidence that these raptors have become monitor prey. Other wildlife potentially at risk are gopher tortoises and large concentrations of pelicans and herons, including those at nearby Sanibel Island. Campbell and his colleagues worry that, given beach access, monitors might start digging up sea turtle nests.

First spotted around Cape Coral in 1990, the monitor population has, like those of brown anole and other introduced animals, grown rapidly after an initial lag. "Its fecundity, eclectic diet, and ability to travel over land and across water would allow the species to disperse widely in Florida.... Extensive canals in southern Florida would provide ideal dispersal corridors," reads the *Southeastern Naturalist* paper. Beyond the canals lie Everglades National Park and Big Cypress National Preserve, then the Florida Keys.

already been among the casualties. Back in the States, toxic toads are probably not as much of a menace to native wildlife. Red-shouldered hawks and crows have been seen flipping them over and tearing into their underbellies, apparently without being poisoned. "In Florida, predators are used to avoiding toads period, or some may have innate immunity to them. There are no native toads in Australia. Predators there have never experienced toad toxin like in the U.S.," says Smith, who notes that most native U.S. toads, when bitten, extrude toxins.

Cuban treefrogs have a toxin in their skin too. "People have been sent to the hospital after handling them and then rubbing their eyes," says Krysko. But the Cuban treefrog toxin cannot match that of the cane toad. "They're best described as distasteful," says Smith. But apparently not to all wildlife: Some native snakes, hawks, owls, and

crows have been seen eating them with no ill effect.

Cuban treefrogs make a noticeable impact on native species through competition and predation. While scientists work on figuring out the extent to which large adult Cuban treefrogs prey upon smaller native frogs, Smith, funded by the U.S. Geological Survey, has been studying what happens just after the frog eggs hatch. Cuban treefrogs often lay their eggs in ephemeral pools that pop up after thunderstorms—small microhabitats free of fish and many other aquatic predators—that are also used by native frogs. Packed into close quarters, tadpoles must compete for limited food. Smith found that "Cuban treefrogs are outstanding competitors as tadpoles and they really do a job on native species." In the presence of the

Cuban treefrog.



Joe McDonald

exotics, many native tadpoles never reach the frog stage of metamorphosis. Many of those that do turn out to be smaller than usual due to lack of food.

—Howard Youth



Bruce Coleman Inc./Joe McDonald

Biologists believe that Burmese pythons released by frustrated pet owners now breed in Everglades National Park.

But how far north might they move? Many tropical species, like green iguanas, appear to be limited by Florida's occasional cold snaps. This may not slow the Nile monitor. "This species could survive cold weather in northern Florida by using underground refugia, as it does in temperate regions of Africa," Campbell and colleagues write. Campbell adds, "They could get pretty far north from here. I wouldn't have any doubt that they could survive in all of Florida and at the southern edges of all southeastern states from Georgia to Texas."

As is the case with other exotics that have crept beyond easy control, the *Southeastern Naturalist* paper recommends that "any individuals that appear elsewhere will need to be immediately eliminated."

Everglades Wildlife: Feeling the Squeeze?

Introduced snakes have not wound up in the sights of Florida's keen-eyed herpetologists nearly as often as lizards, but two have become firmly entrenched.

From the mid-1990s through 2004, 113 Burmese pythons (*Python molurus*), including one measuring up to 14 feet long, have been seen on or collected from the wetlands and main park road of Everglades National Park. In January 2005 alone, 15 more turned up. Based on the varied sizes and locations, park officials believe the snakes are breeding.

The pythons, like the monitors, likely originated from growing pets cast off by panicked owners. Park biologists fear that the local "mangrove" form of fox squirrel (*Sciurus niger*), the wood stork (*Mycteria americana*), and other threatened species might soon become prey items. So far, animal remains found in park pythons include those of pied-billed grebe, white ibis, house wren, opossum, raccoon, cotton rat, and the black rat.

Park wildlife biologist Skip Snow is also a bit concerned about visitor and employee safety. Among the world's largest constrictors, Burmese pythons can reach 20 feet or longer. "These are large predatory animals. While not known to do it, the python has the tools and

techniques to kill people, as supported by foolhardy pet owners who didn't handle feeding time correctly," he says. Snow believes, however, that the pythons will pose more of a road safety threat, perhaps causing unsuspecting motorists to swerve off the park road at night when they spot what looks like a log lying across the pavement. (On cool nights, pythons may haul out onto the road to soak up heat radiating off the pavement.)

Far smaller and far more widespread is the bizarre and rarely seen Brahminy blind snake (*Ramphotyphlops braminus*). At most, it grows to seven inches long—the shortest snake living in North America—and resembles a scaly, dark earthworm. This burrowing animal has traveled across the state in potted plants and can now be found in a variety of areas, especially under logs, trash, and other debris; thought to be Asian in origin, it now also occurs in Mexico, Central America, Africa, and Hawaii. Many herpetologists consider the Brahminy blind snake to be one of the most widespread reptiles in the world. It eats termites and other insects and in turn has been eaten by cane toads and Puerto Rican crested anoles (*Anolis cristatellus*), another introduced anole species breeding in Florida. Don't try to find a male—only females occur. Reproducing by a process known as parthenogenesis, females produce offspring genetically identical to themselves.

Florida's list of 40-plus exotic reptiles and amphibians will likely continue to grow. While laws prohibit the release of exotic animals into the wild, none are currently in place to prohibit the import of popular and potentially invasive pets such as monitors, pythons, and iguanas. In flower pots, cars, or on crates, they continue their creep across Florida, while scientists keep tabs on them, reel them in, and try to figure out how to keep them under control. Z

—Howard Youth has been fascinated by Florida's introduced reptiles since the 1970s, when as a boy he spent vacations reaching around palm trees in often-vain attempts to capture brown anoles.

Books, Naturally

To See Every Bird on Earth: A Father, a Son, and a Lifelong Obsession

Dan Koeppel. 2004. Hudson Street Press, New York. 304 pp., hardbound. \$24.95.

In 1999, on a tiny island in Brazil's Rio Negro, Dan Koeppel popped the cork on a bottle of champagne he'd been toting through the Amazon in his backpack. After pouring warm bubbly into paper cups, he toasted a truly rare achievement. With a sighting of an Amazon black tyrant—and after 50 years of birding—his father, Richard, had added his 7,000th bird species, out of a total of about 10,000, to his life list.

Koeppel joined this trip not because he is a serious birder, and not only to witness and celebrate his father's milestone, but because at age 40 he was struggling to understand, in order to forgive, the solitary, aloof, unhappy man whose single-minded passion for listing birds blighted his son's life. With this beautifully written book, Koeppel achieves both understanding and forgiveness.

Artfully weaving biography, autobiography, and the history of birding in America in *To See Every Bird on Earth*, Koeppel tells a story that will fascinate anyone who birds, lives with a birder, or, for that matter, anyone who is obsessed with an arcane pursuit or living with such a person. Like me and my father.

My father didn't just play golf, he was a golfer. As a teenager skipping school to play golf in the late 1930s, he dreamed of a professional life on the links. He could have been a contender, but his dreams, like those of many men, were deferred by service in World War II and then taking a job to support a new family. Frustrated and bored a few years later, he wanted to take a shot at the pros but my mother opposed his taking the risk—and he bowed to the pressure. Later, he started—and sometimes neglected—his own small business so he could play golf first three, then four, five, or more days a week in all but the worst weather. When he wasn't playing, he watched golf on television or read golf magazines. He was never home

on a nice weekend; it was the only thing my parents ever fought about.

Richard Koeppel, at age 11, was hooked on birds with his first sighting of a brown thrasher in Queens, New York, in the 1940s. As a teenager, he became a member of New York's elite birding community and dreamed of becoming an "ornithological buccaneer." His parents had other plans. Richard was to be a doctor, and they actively tried to squelch his birding. Torn, Richard first chose neither, majoring in French literature at Cornell, then spending a few aimless beatnik years in Greenwich Village, birding on the side. Finally, though, he caved, became a doctor, and got married. But his career, his wife, and his two sons always came second to birding. His obsession grew ever stronger after his marriage collapsed until, in middle-age, he decided to become a "Big Lister" and ratchet up his life list from under 2,000 birds to more than 7,000, a feat fewer than a dozen others have accomplished. And with this, Richard was content. Koeppel writes, "My father is a brilliant man who has lived a life that, in so many respects, didn't turn out the way he wanted. He buried the sadness of his disappointments by watching birds. . . ."

Millions of Americans bird in more or less casual ways, but the world of serious birding, the arena of Big Listers, is something else. It is peopled with men and women willing to do anything—spend fortunes, ignore family and friends, risk their lives in remote, dangerous places—to count one more bird. Phoebe Snetsinger crisscrossed the globe to count nearly 8,500 birds, at a cost of about two million dollars. Her birding hobby got serious after she was given less than a year to live. Forgoing most

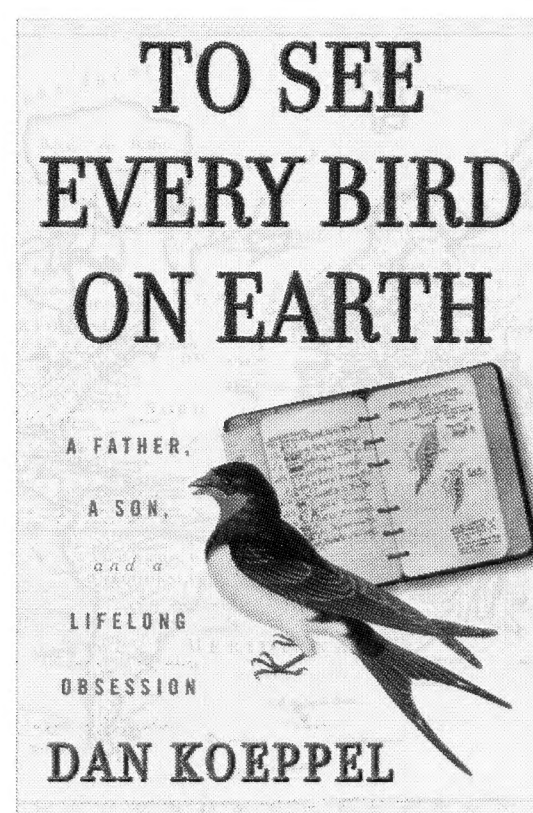
treatment for her cancer, she set out to use her remaining time to count birds. Her obsession probably accounts for her surviving for more than 20 years; she died in a bus accident while birding in Madagascar. She skipped her daughter's wedding to bird.

Serious birding has its own esoteric rules and strict code of honor. While Big Listers are almost never professional ornithologists, they religiously track changes in the scientific taxonomy of birds. If scientists decide that a species thought to be one is actually two, the listers tick off each species only if they've seen both in the right places; if two species are "lumped," they must erase one tick. New species are being named all the time, so, "as with stars and snowflakes, there's always one more bird to tally." And, belying the image of birders as mild-mannered duffers, big birders are intensely competitive, with each other and with themselves.

Koeppel concludes that birding is a special obsession because of its connection with nature. "We don't name birds, we don't number birds, for birds; we do it for each other. When we do, we get, just briefly, to soar alongside them." On this point I disagree: the object of one's obsession needn't be natural to be uplifting. I suspect that my father, just briefly, soared alongside an unnatural small

white ball every time he swung and sent one into the sky. *To See Every Bird on Earth* is a marvelous book.

—Susan Lumpkin



Dan Koeppel will sign and talk about his book on June 14 at 7 p.m. in the National Zoo Visitor Center. Please RSVP for this free program at www.fonz.org/lectures.htm.

BioAlmanac

by Deborah Press



Kenneth Catania

Fast Food

When it comes to “prey profitability,” the star-nosed mole (*Condylura cristata*) is taking its stellar schnoz all the way to the bank. As the fastest mammalian forager, it can catch and consume small invertebrates in less than one-fifth of a second, reaping high energy payoffs. A recent

study suggests that the critter’s keen tentacle-fringed snout evolved to optimize speed and efficiency during foraging. The study, published in the February 3 issue of *Nature*, was lead by Vanderbilt biologist Kenneth Catania, who studied star-nosed mole behavior at the National Zoo in the 1980s.

A star of 22 pink, finger-like appendages encircles the mole’s nostrils. The tentacles, each endowed with thousands of sensory receptors, scour the damp soil of the mole’s wetland habitat in constant pursuit of earthworms and aquatic insects. Upon contact, a star-nosed mole seizes prey with its front teeth and polishes it off within a fraction of a second. The star’s rapid searching motions—it typically touches 13 surfaces in a second—and the expanded area available for sensory receptors enable *C. cristata* to encounter 14 times more prey than other moles. With this unusual adaptation, star-nosed moles exploit the abundance of tiny prey found in moist tunnels and on the bottoms of streams.

What’s in a Name?

Cuttlefish species are masters of deception, protean in their capacity to change shape and color. Take, for example, giant cuttlefish (*Sepia apama*). Scrawny males disguise themselves as females to sneak past larger, possessive males, and steal their mates. Equally deceptive is the cuttlefish’s common name. It is not a fish at all, but a mollusk of the class Cephalopoda, along with squid, octopus, and nautilus species. Jellyfish and starfish species are also improperly dubbed fish, but giant cuttlefish really embrace the role—sci-



Jeff Rotman/www.jeffrotman.com

entists have observed cuttles undercover, apparently mimicking fish to deceive predators. Cuttlefish have sac-shaped bodies, and their name may derive from the Old English word

for the creatures—“cudele,” possibly related to the Middle Low German “küdel” meaning container or pocket—or from the Old Norse “koddi,” meaning cushion or testicle.

The cuttlefish genus *Sepia* lends its name to the rich brown tones found in wash drawings and nostalgic photographs. When threatened, cuttlefish expel a smoky cloud of concentrated melanin called ink. A compound in the ink may also impair the predator’s sense of smell and taste. Authentic sepia ink is prepared from the dried ink sacs of the common cuttlefish, *Sepia officinalis*. Today, sepia color usually comes from watercolor paint, although true cuttlefish ink is still available.

Why Do Cats’ Eyes Glow in the Dark?

Cats and some other nocturnal mammals enhance their night vision by means of an iridescent layer of cells behind their retina called a *tapetum lucidum*. When light enters the eye, it stimulates rods and cones (light and color receptors) on the retina. In animals with a *tapetum lucidum*, the light not initially absorbed by the retina bounces off the *tapetum* and back into the retina to stimulate the photoreceptors a second time. The reflection of low light off of the shiny *tapetum lucidum* causes cats’ eyes to appear to glow in the dark.

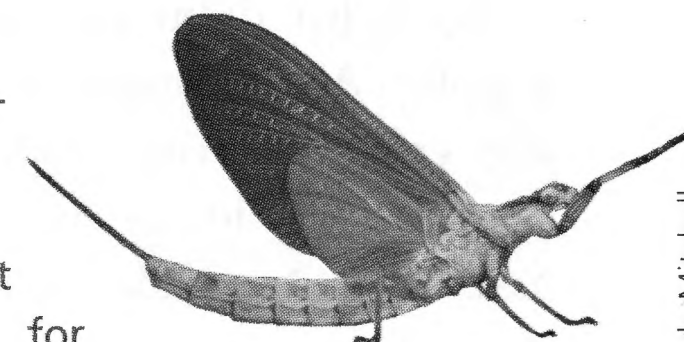
Fact or Fiction: Octopuses Have Eight Tentacles

The terms tentacles and arms are often used interchangeably, and incorrectly. Tentacles are used exclusively in prey capture and consist of an elastic shaft with suckers or sharp hooks covering only the terminal club. Arms are cone-shaped and studded along their entire length with rows of suckers. Octopods actually have eight arms but no tentacles. Ten-limbed decapods, such as squid, also bear eight arms plus a pair of feeding tentacles. The tentacles dart out beyond the reach of the other limbs to strike prey and deliver it to the eight eager arms, which hold the food as it is eaten.

Arms serve a variety of functions. Many octopuses are tactile feeders, probing crevices with their sucker-lined limbs to find bivalves and crabs. This “speculative groping” is accomplished, in part, by receptors in the rim of the sucker that sense texture and taste. Octopuses also use their arms to walk along the ocean floor, and many octopuses and some squid use a modified arm for copulation.

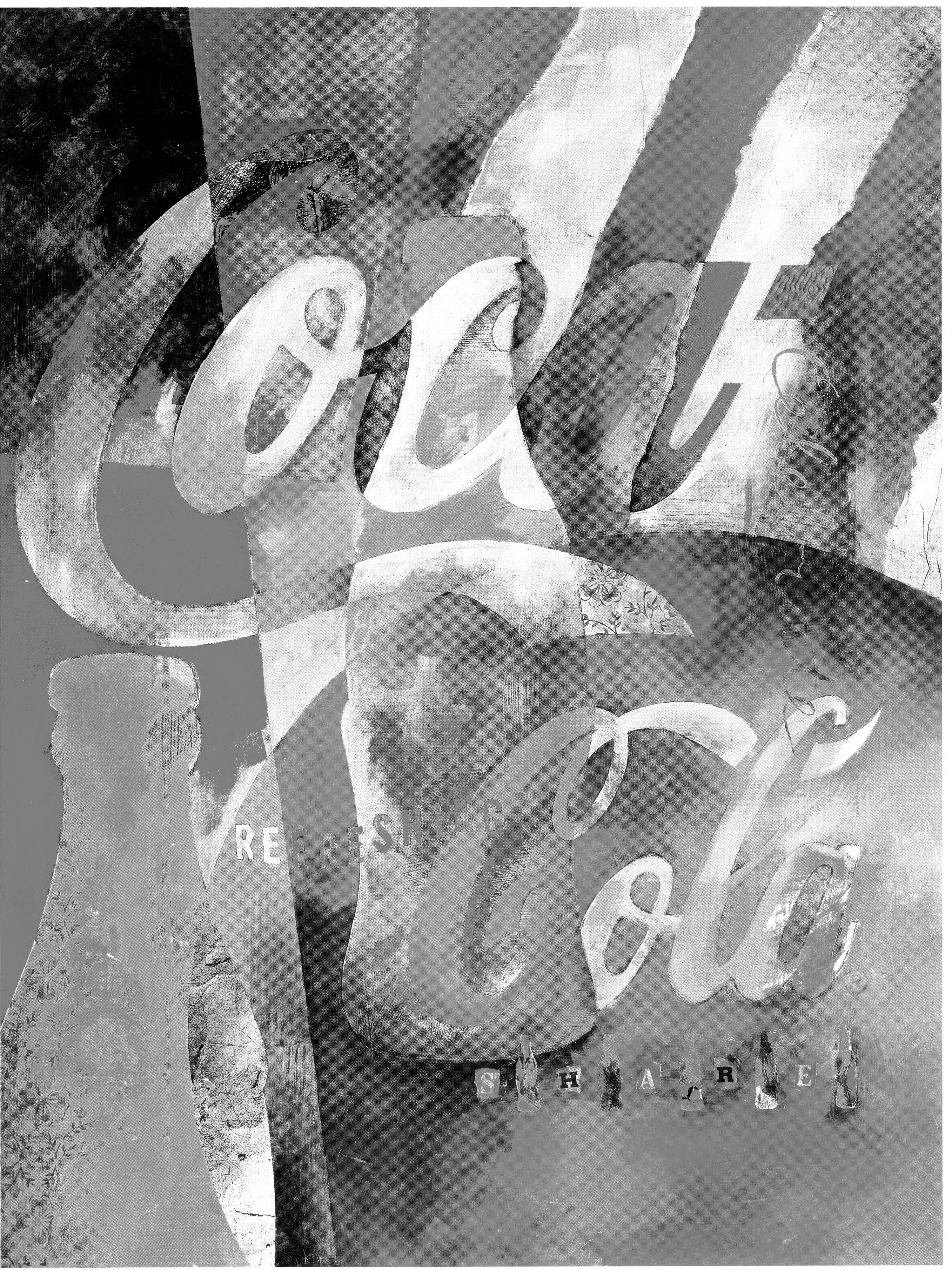
In Season

For some species of mayfly, spring or early summer twilight sets the scene for their dramatic emergence, midair mating, and immediate death. These translucent-winged insects of the order Ephemeroptera (Greek for “lasting but a day”) swarm over bodies of freshwater for their nuptial flight. After mating, mayflies deposit eggs and then perish, becoming food for aquatic fauna and popular bait for fly fishermen. In some communities around the Great Lakes, the mayfly emergence causes quite a stink—decaying carcasses accumulate on beaches and emit a rotten, fish-like stench. Mayflies are nothing to sniff at, however: The presence of these insects indicates a healthy freshwater ecosystem.

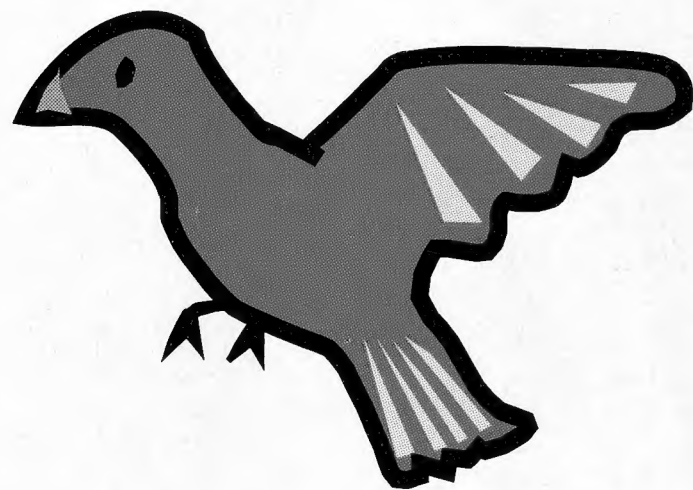


Robert & Linda Mitchell

The goliath bird-eating tarantula (*Theraphosa blondi*) is the world’s largest spider. It has a legspan of 11 inches and can weigh more than six ounces.

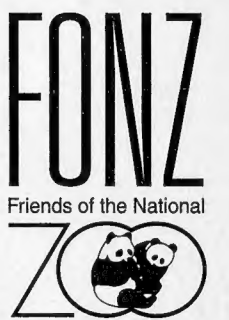


National ZooFari tips, continued.



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